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Clean Water regulations proposed for organic chemical manufacturing and the inorganic chemical sectors

Ontario has released draft Clean Water regulations to protect the environment from effluent discharges from the organic chemical manufacturing (OCM) and inorganic chemical (IC) sectors.

The Clean Water regulations establish limits for pollutants discharged by manufacturing plants in the two sectors. They are designed to reduce significantly the amount of toxic and other pollutants entering Ontario's waterways from the chemical industry. The regulations are being developed under the Municipal Industrial Strategy for Abatement (MISA) program.

The OCM and IC sectors are two of the largest users of water in Ontario. Water is used mainly for cooling, but significant quantities are also used for process purposes.

Reducing the quantity of toxic chemicals discharged in effluents from the organic and inorganic chemical sectors will reduce the risks posed to the environment, human health, fish and wildlife. The Clean Water regulation limits also will contribute to initiatives such as the Canada-Ontario Agreement respecting Great Lakes Water Quality and the Remedial Action Plan program, the Lake Ontario Toxic Management program.

THE ORGANIC CHEMICAL MANUFACTURING SECTOR AT A GLANCE

Companies in the organic chemical manufacturing sector make a variety of products, including plastics, fibres, synthetic rubbers, detergent bases, industrial solvents and gasoline additives.

The OCM sector employs about 9,800 people at 26 plants. The plants are distributed mainly along the Great Lakes Basin:

AREA	NUMBER OF PLANTS
Sarnia	10
Kingston/Cornwall	7
Toronto/Durham	3
Niagara	2
Cobourg	1
Amnrior	1
Elmira	1
Longford Mills	1

Plants in the OCM sector discharge into the St. Clair River, Niagara River, St. Lawrence River, Ottawa River, Grand River, Lake Ontario and Lake St. John. Major plants in the sector include Dow Chemical, Dupont Canada Inc., Imperial Oil (Esso) Chemicals Division, BASF and Polysar Rubber Corporation.

THE INORGANIC CHEMICAL SECTOR AT A GLANCE

Companies in the inorganic chemical sector produce fertilizers, abrasives, carbon black, mineral-based insulating materials, industrial gases, acids and explosives.

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The IC sector employs about 3,000 people at 25 plants:

AREA	NUMBER OF PLANTS
Sarnia	7
Niagara	6
Cornwall/Maitland	5
Port Maitland	2
Sault Ste. Marie	1
North Bay	1
Hamilton	1
Amherstberg	1
Elmira	1

Plants in the inorganic chemical sector discharge into the St. Mary's River, St. Clair River, Detroit River, Niagara River, St. Lawrence River, Grand River, Lake Erie, Lake Ontario and Lake Nipissing. Major plants in the sector include: ICI Canada, Terra Industries Inc., General Chemical Canada Ltd. and Norton Ceramica.

COST OF IMPLEMENTING THE REGULATIONS

The estimated capital cost of compliance with the proposed limits for the organic chemical sector is \$51.6 million, with an estimated annual operating cost of \$16.1 million.

The estimated capital cost of compliance with the proposed limits for the inorganic chemical sector is \$16.9 million, with an estimated annual operating cost of \$1.85 million.

GOAL OF MISA

The Clean Water regulations for the organic chemical manufacturing sector and the inorganic chemical sector were developed under the Municipal/Industrial Strategy for Abatement (MISA) program.

The goal of MISA is the virtual elimination of persistent toxic substances from effluents discharged into Ontario's waterways. MISA was introduced in 1986 to identify and reduce the pollutants discharged from industrial and municipal sources into Ontario's rivers and lakes.

The first phase of the program – monitoring the effluents from 300 major industrial direct dischargers – was completed in August 1991. In

September 1991, the Ministry of Environment and Energy published the Issue Resolution Final Report which defined concepts crucial to the development and implementation of the Clean Water regulations. At the same time, the ministry introduced a new direction for the MISA program which included:

- the identification of pollution prevention as the preferred approach to achieve the virtual elimination of persistent toxic substances
- the establishment of effluent limits for a list of sector-specific parameters
- the establishment of a ban or phase-out list for specific persistent toxic substances
- the requirement that final effluents cannot kill fish or water fleas as measured by standardized tests

The ministry has now embarked on the second phase—the effluent limits regulation of industrial sector dischargers—to reduce the amount of toxic and conventional contaminants being discharged.

REDUCTION OF LOADINGS

The limits in the proposed regulations are expected to reduce discharges of toxic chemicals of concern by almost 50 per cent from the OCM sector and by about 16 per cent from the IC sector.

These chemicals include seven contaminants on the ministry's list of candidate substances for bans, phase-out or reduction: arsenic, mercury, 1,4-dichlorobenzene, phenanthrene, hexachlorobenzene, PCBs (polychlorinated biphenyls) and poly-chlorinated dioxins and furans.

Estimated reductions of conventional pollutants (such as total suspended solids) for the OCM and IC sectors are 43 per cent and 22 per cent respectively.

WHAT ARE THE MAJOR ENVIRONMENTAL CONCERNS

Some wastewaters from the organic chemical manufacturing and inorganic chemical sectors contain persistent toxic chemicals such as chlorinated solvents, polychlorinated dibenzodioxins and dibenzofurans, polychlorinated biphenyls (PCBs) and heavy metals such as mercury, nickel, zinc and chromium. The wastewaters also contain

conventional pollutants such as suspended solids, phosphorus and nitrogen compounds, and oil and grease which could impair the uses of water.

Persistent toxic chemicals including heavy metals can accumulate in sediments on the bottom of a body of water and can be harmful to human health, fish, aquatic plants and other aquatic life. These chemicals have been linked to cancers and birth defects in humans.

ESTABLISHING THE DISCHARGE LIMITS

The clean water limits in the regulation are based on the results of a 12-month regulatory monitoring program and an examination of the best available technology (BAT) for reducing the discharge of contaminants in each sector.

The ministry defines BAT as a combination of demonstrated treatment technologies and industrial process changes that can reduce or eliminate pollution and are affordable to the industry. To determine BAT, the ministry hired consultants to conduct a world-wide search for modern wastewater treatment practices applicable to the two sectors.

Once the limits are established, the regulated plants are free to choose how they meet the limits. For example, rather than installing end-of-the-pipe treatment, companies may choose to implement pollution prevention measures.

A description of the available technologies for the two sectors are contained in the BAT consultants' report.

The OCM and IC sector Clean Water regulations will result in the application of legally enforceable limits across the province.

REGULATED REQUIREMENTS

Because of the product and process diversity in the two sectors, each plant has a site-specific set of limits for the parameters of concern at the site.

Sector-wide parameters that are limited at every OCM sector plant are dissolved organic carbon (DOC), phosphorus, total suspended solids, phenolics, and oil and grease.

Similarly for the IC sector, total suspended solids, DOC and phosphorus are limited at each plant.

All final discharges at all plants must not kill fish or water fleas (as demonstrated by a standard acute-lethality test) and must be within a pH range of 6.0 to 9.5 at all times.

All plants must ensure that their wastewaters meet the following concentration limits for dioxin and furan groups:

- <20 picograms/L for 2,3,7,8-tetrachlorodibenzo-p-dioxin
- <50 picograms/L for 2,3,7,8-tetrachlorodibenzofuran
- For 17 other types of dioxins and furans, the total toxic equivalent (TEQ) must be ≤ 60 picograms/L

A listing of the 17 other types of dioxins and furans and the method for calculating their total toxic equivalent concentration are described in the Sampling and Analytical Protocol.

COMPARISON TO OTHER JURISDICTIONS

The proposed limits for the organic chemical manufacturing sector were reviewed against limits or guidelines of other jurisdictions including other Canadian provinces, the United States and Europe. The Ontario limits were found generally to be more stringent.

APPLYING THE DISCHARGE LIMITS

There are two general approaches to reducing the quantities of pollutants in plant effluents: in-plant pollution prevention and end-of-pipe treatment.

In-plant pollution prevention consists of process modifications, chemical substitution and water reduction and recycling. In the organic chemical manufacturing sector, for example, one plant has replaced the harmful chemical benzene which was used as a solvent, with the less harmful chemical cyclohexane.

In-plant recycling of wastewaters is becoming a common practice in industry. Typically, pollutants can be removed from wastewaters by treatment such as filtration and the cleaned-up water can be re-used in the process.

End-of-the-pipe treatment processes commonly used in these two sectors to improve effluent quality include filtration or sedimentation, biological treatment, and activated carbon adsorption.

In addition to limits on specific parameters, plants in the OCM and IC sectors are required to monitor cooling waters, conduct chronic toxicity tests on final effluents and carry out storm water control studies.

The regulations also incorporate a number of standard monitoring and reporting requirements (in common with clean water regulations for other MISA sectors). Sections of the regulations govern: compliance monitoring, the location of sampling points, sampling and analytical procedures, toxicity testing, the calculation of loadings, effluent flow measurement, quality control, record keeping and reporting to the ministry and the public.

HOW THE REGULATION WAS DEVELOPED

The draft regulations for the OCM and IC sectors were developed through the participation of the chemical industry, the Canadian Chemical Producers' Association, the Ontario Ministry of Environment and Energy, and the federal government in two Joint Technical Committees. A representative of the MISA Advisory Committee of independent environmental experts also attended the Joint Technical Committee meetings. A 60-day comment period will be provided for public input to both draft regulations.

PENALTIES FOR VIOLATIONS

Corporations not complying with Clean Water regulations can be subject to a maximum fine of \$50,000 per day for a first conviction and \$100,000 per day for subsequent convictions.

WHERE TO GET MORE INFORMATION

To receive obtain copies of the draft Clean Water regulations for the organic chemical manufacturing and the inorganic chemical sectors please call the Ontario Ministry of Environment and Energy's Public Information Centre at 1-800-565-4923.